Constructing identity: The situated roles of individual differences, intergroup behavior, group status, and economic outcomes in the formation of social identification

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# Abstract

Social identification can be seen from a situated social cognition perspective as a power-based dynamic process involving an interplay between intergroup behavior, economic outcomes, and individual differences. In this study, we used an evolutionary economic game experiment to model these dynamics across structural conditions previously found to impact on social identification: a) group size, b) group permeability, and c) group status. Results showed partial support for social identity theory. We found that individual differences were more central to identification when groups were equal in wealth, that group behaviors were more important when groups were permeable and/or unequal in wealth and size, and that status and outcomes were most important in determining identification when groups were distinctive and impermeable. However, contrary to prior findings, absolute levels of identification did not vary by structural condition. We discuss these results with reference to specific findings and predictions from SIT, showing that category membership was psychologically impactful to the extent and manner it could support people’s ability to cope with social and material circumstances. We discuss the implications for future research on social identification and the integration of identity and interdependence in the reproduction of identification as well as in intergroup bias and discrimination.

Identifying with a group is a complex process that people perform throughout the existence of their group. Social identification can be seen as a function of individual differences (e.g., Ellemers, Spears, & Doosje, 1997), but also responsive to situational cues e.g., salience), strategically as part of behavioral identity performances (e.g., Klein, Spears & Reicher, 2007), and as a socio-functional tool for competing for material resources (see for example Sherif & Sherif 1966; Turner & Bourhis, 1996). In addition, social identity theory asserts that social identification is responsive to the relative intergroup status position, the presence of realistic alternatives to the present group membership or group hierarchy, and how present group membership compares to this alternative (Ellemers, 1993).

Smith and Semin (2004) and others have argued that it is impossible to separate the dynamics of personality, behavior, and outcome, or to understand them in a decontextualized way. They have shown how even abstract cognitions and complex patterns (such as group identity) and stable traits (e.g. personality), derive from behavioral feedback, social feedback, and objective change, that these concepts themselves can be differently constructed in different situations, and are adapted for action responsive to such situational constructions,. For example, ceteris paribus, how do equal or unequal intergroup settings structure behavioral choices and collective outcomes of different individuals belonging to high and low status groups, who have done better or worse in the intergroup interaction, and how does the interacting social structure, behavioral process and economic outcome affect social identification? In this paper, we propose an understanding of social identity as situated cognition, and we attempt to further understand the concurrent causal dynamics involved in identification, and their degree of importance across structurally different minimal intergroup settings. More precisely, the aim of this paper is to show under what structural conditions individual differences, behaviors, and outcomes, considered separately, and in combination, are most important in specifying intra- and intergroup differences in social identification.

There are both inductive and deductive channels of influence between degrees of social identification and structural dynamics of intergroup situations. The deductive routes have been well-specified by social identity theory, which goes so far as to claim that social identities are so strongly shaped by the nature of the intergroup situation as to be veridical (Oakes, Haslam & Turner, 1994). Tajfel and Turner (1979, 1986) proposed that group identification would depend on three structural factors: status relations between the groups, legitimacy of the status hierarchy, and permeability of group boundaries. They hoped to develop a dynamic theory of social identification that looked beyond individual differences and universal processes to intergroup contexts and real social relations. From this perspective, structural variables such as group permeability, size, and inequality, are likely to alter identification through their effects on collective status, outcomes, and alternative action choice set (Turner & Reynolds, 2002). Indeed, experiments manipulating such structural variables have shown that group size, inequality and boundary permeability affect social identification respectively by promoting feelings of exclusivity and status defensiveness (Ellemers, 1993), perceptions of status stability (Ellemers, et al.,1988), and by rendering relative status more salient (Ellemers, 1993).

In this deductive top-down perspective, structural conditions affect social identification which, in turn, affects behavioral outcomes such as ingroup favoritism (Tajfel & Turner, 1979; Hogg, 2016). Of course, individual difference also matter in this model (Reynolds, Turner, Haslam & Ryan, 2001). Studies have shown that individual levels of identification, when manipulated or observed, regardless of group status or permeability, are deeply implicated in group cohesion, commitment, and perceptions of homogeneity (e.g., Ellemers, Spears, & Doosje, 1997).

The inductive process by which social identification emerges from interaction is less well specified. Interest in the inductive processes first gained traction in controversies about whether the bias evident in the minimal group studies was attributable to categorization or interdependence (Rabbie. Schot, & Visser, 1989; Tajfel & Turner, ????; Turner & Reynolds, ????). Interdependence theorists argued that social behavior emerged from dynamic intergroup and interpersonal dependencies and outcome expectancies that evolved in interaction (Rabbie. Schot, & Visser, 1989).

Recent years have also seen the emergence of an expanding body of research into the inductive, bottom-up pathway to social identity formation (see for example Postmes, Haslam & Swaab, 2005; Jans, Postmes & Van der Zee, 2012; Koudenburg *et al.*, 2015). This work has shown that social identification with a group can develop from interpersonal interaction among individuals even in the absence of an outgroup. Postmes and his colleagues have individuals sing songs or engage in other collective activities to promote the emergence of shared identification. This contrasts with the deductive (top-down) pathway to social identification where social actors primarily draw upon salient social categories or are assigned category membership by experimenters. Social identification, which arises in intra- and intergroup interaction and a developed sense of shared fate, has been shown to support collective action and radicalization (Thomas, McGarty, & Mavor, 2016; Thomas, McGarty, & Louis, 2014; Reicher & Haslam, 2013). Moreover, because social interaction can undermine the social influence effects of deindividuation (Postmes, Spears et al., 2005) this inductive pathway can promote social identification effects of individual performance and outcomes.

There is no doubt that both pathways to identification operate simultaneously. Both categorization and interdependence are implicated in intergroup behavior (e.g., Balliet, Wu, & De Dreu, 2014; Durrheim, Quayle, Tredoux, Titlestad, Tooke, 2016, Gaertner & Insko, 2000; Platow, Grace & Smithson, 2012; Stroebe, Lodewijkx, & Spears, 2005). This theoretical integration suggests contextual variation in the relative importance of the different mechanisms. We can also expect that other structural conditions (e.g., group size) will affect motivational priorities (e.g. self-enhancement vs threat to self-esteem) to produce intergroup behavior (Leonardelli & Brewer, 2011).

Together, this literature paints a complex and fragmented picture of the process of social identification. Much research is yet to be done to understand how the inductive and deductive paths function together: 1) how inductive processes operate under different imposed structural conditions; 2) how intra- and intergroup interaction influence inductive-type identities in these contexts, (3) how different kinds of interactional behavior, and (4) individual differences in performance and outcomes affect identification.

A situated social cognition approach (Smith & Semin, 2004) would promote a view of social identification as a feedback mechanism in which the products of group identification (e.g., intergroup behaviors such as ingroup favoritism) are themselves implicated in constructing that identification over the course of intergroup interaction. Thus, according to this organizing framework, one way to envision an integration of inductive and deductive pathways would be to model identification as a feedback mechanism, wherein initial identification is informed and influenced by intergroup interaction and the consequences of such interaction, in terms of collective and individual outcomes, to (re)produce identification (for more research showing the mediational role of intergroup behavior in identification, see also Thomas, McGarty, & Mavor, 2015). In this paper we explore this integrated pathway process across structural conditions, varying by group wealth, group size, and group permeability/distinctiveness (see Figure 1 for process model, Table 1 for a list of structural conditions).

We took an economic game approach to the design of this study. We designed it as a minimal intergroup game to assess how a) permeability (by removing group boundary distinctions), b) personal status (by random assignment to rich or poor groups), and c) group size (random assignment to minority/majority vs homologous groups) affect ingroup identification prior and subsequent to interaction, and the individual outcomes and intergroup exchange behaviors that are both hypothesized to influence the post-test measures of ingroup identification. Because this integrative dynamic model has never been tested in a single experimental design, we consider this study more exploratory than confirmatory (aiming to replicate the findings from specific research perspectives). Nonetheless, we discuss the results in comparison to findings from social identity and bounded reciprocity literatures in particular.

## Method

### Participants and Procedure

The sample consisted of 280 student volunteers (127 Females, 146 Males; 257 Black, 3 White, 3 Coloured, 9 Indian, 1 other)1 who each participated in one of twenty 14-player experimental games. The mean age of the participants was 20.4 years (SD = 2.2 years). All participants provided written informed consent to participate in the study, which had been approved by the Human Sciences Research Ethics Committee of the University of KwaZulu-Natal.

### Design and Procedure

Groupness can be inferred from multiple dimensions, and this affects identification targets, perceptions of permeability, and other relevant dimensions of group identity and the intergroup context. Different conditions make salient different dimensions of groupness (i.e., boundaries, status, and group size).

Participants in the study each played one of 20 14-player experimental games in which each player was required to give one monetary token to any of the participants in each of 40 rounds. The games were hosted on VIAPPL (see viappl.org for a description of this experimental platform), through which we were able to implement group distinctiveness, group status and group size as structural game conditions (see Table 1).

*Distinctiveness*: Distinctiveness was manipulated by assigning players to one of two groups by way of a dot estimation task and then colour-coding player avatars to highlight group identity. This task does not elicit status comparisons, as both groups “fail” to estimate the number of dots by being told they have overestimated or underestimated. This was done in order to give groups distinctiveness for the participants before they were introduced into the game arena and interacted. In reality, players were randomly assigned. In the distinctiveness control condition, players did not perform the dot estimation task, were not visibly assigned to groups, and all initial avatars were identical in appearance. For analytic purposes, we assigned participants to the same underling pattern of group belonging as in the distinctiveness condition, but their group identities were masked and unknown to participants. This allowed us to determine the effect of group assignment on identification and behavior.

*Status*: Status was manipulated by changing the number of tokens each player had at the start of the game. In equal status conditions, all participants received 20 tokens at the start of the game, whereas in unequal status conditions, the high status group received 30 tokens while the low status group received 10 tokens. The status manipulation was fully crossed with the group distinctiveness condition resulting in 4 game conditions.

We were also interested – given modern sociopolitical systems, particularly extremely unequal and oligarchic societies – in manipulating group size to create a high status minority and low status majority. We developed a wealthy minority group condition in which the high status 30-token groups were a numerically small group (n=4) in comparison with the larger (n=10) low status 10-token group, as opposed to all other conditions, in which groups were of equal size (n=7). The manipulation of group size was not fully crossed with the equality and distinctiveness manipulations.2

We thus obtained five conditions. Four games (sessions) of 14 players were played in each of the five conditions, with a total of 56 players under each condition (per condition, N=4, n=56; total, N=20, n=280). We named each condition to highlight the nature of the structural relations that predominated in those games (see Table 1):

1. Full Equality (IE): equal status, interacting individuals with group identity masked.
2. Intergroup Equality (GE): equal size, equal status, interacting distinctive groups.
3. Individual Mobility (IM): equal size, unequal status groupings of interacting individuals with group identity masked. Group identity is apparent only from starting balance, making mobility possible by wealth accumulation of loss.
4. Intergroup Inequality (GI): equal size, unequal status, interacting distinctive groups.
5. Wealthy Minority (WM): unequal size, unequal status, interacting distinctive groups.

**Table 1**. Description and naming of the five conditions in this experiment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Condition No. | Condition Name | Distinctiveness (Avatar Colour) | Status (Initial Token Number) | n (number of players in group) |
| 1 | Inter-individual equality (IE) | No | Equal | Equal |
| 2 | Intergroup equality (GE) | Yes | Equal | Equal |
| 3 | Individual mobility (IM) | No | Unequal | Equal |
| 4 | Intergroup inequality (GI) | Yes | Unequal | Equal |
| 5 | Wealthy minority (WM) | Yes | Unequal | Unequal |

Note. 4 games were played in each condition, making a total of 20 games

### Measures

*Social identification*. Social Identification was measured by responses, on a 7-point Likert scale, to the items: 1) I identify with other members of my group/the group as a whole, 2) I have a sense of belonging to my group/the group as a whole (Terry & O’Brien, 2001), and 3) I feel strong ties with my group/the group as a whole (Doosje, Ellemers, & Spears, 1995). In the distinctiveness condition, identification was linked to the assigned group identity (my group), but in the non-distinctiveness condition identification was associated with the group of participants in the game as a whole.

The instrument has obvious face validity and had been found to be reliable and uni-dimensional in previous studies implementing this design paradigm (VIAPPL). Social identification was measured on two occasions: (1) The pre-game measure was administered after the group assignment and after the participants played a two-round practice trial, in which they learned and practiced how to play the game, but which also gave them a sense of group membership, and (2) The post-game measure was administered immediately after the 40 round game was completed by all players.

*Token Change* (TC). Token Change operationalized individual outcomes, measured as the increase or decrease of tokens per individual over the course of the game. This served as an index of individual mobility in the absence of group distinctiveness (i.e., the full equality and individual mobility conditions) and as an index of relative status in the three group distinctiveness conditions.

*Ingroup favoritism* (IGF). Ingroup favoritism is a measure of the extent to which individual favored ingroup over outgroup members in their allocations over the course of the game. We computed IGF as the proportion of non-self-giving that was ingroup giving, aggregated across rounds for each individual player:



*Outgroup aid* (OGA). Outgroup aid is a measure of token receipts to each individual rather than the allocations made by the individual. It was conceptualized to be independent of both ingroup favoritism and self-giving, and measured as the proportion of tokens received by an individual that came from outgroup rather than ingroup members over the course of the game:



### Analysis

We used multi-group complex data modelling (MPlus, restricted maximum likelihood estimator with stratified complex data) to account for the nesting of the data. This approach is described by Muthén & Muthén (2014, p. 251) as computing:

“standard errors and a chi-square test of model fit taking into account stratification, non-independence of observations due to cluster sampling, and/or unequal probability of selection.”

This approach maximizes weighted loglikelihood functions to estimate parameters. Robust estimation of standard errors using the sandwich estimator and robust chi-square tests of model fit are provided using mean and mean and variance adjustments as well as a likelihood-based approach. These procedures take into account non-normality of outcomes and non-independence of observations due to cluster sampling.

The optimization algorithms used was the Expectation Maximization (EM) algorithm (Dempster et al., 1977). Bootstrapping is not possible for these models using the COMPLEX algorithms. This analytic technique differs from multilevel modelling in the typical sense, because MLM models each level of the multilevel data, thereby modeling the non-independence of observations due to cluster sampling, whereas the complex data approach modifies standard errors and chi-square estimations to account for clustering and stratification while keeping analytic focus on a single (individual) level of interest. In this study, we are more interested in what is happening in terms of the process of identification at the individual level between conditions, taking into account group and game clustering. This, as well as the lower power demands of the complex data approach, constitute the rationale for selecting this analytic procedure over a classic MLM approach such as SEM or multilevel growth models (for more information on the use of this method, see Asparouhov, 2005, and Asparouhov and Muthén, 2006).

In this study, individual players were nested within games, which was the cluster variable in the model. Games were nested within condition, which was our group variable. The equal and unequal wealth conditions were not fully nested, due to the lone group-level (nested within game) variable, Status. Therefore, we modelled the conditions where groups were equal (Conditions 1 (IE) and 2 (GE) in Table 1) separately from those under which groups were not equal (IM, GI, and WM), giving one two-group multilevel path analysis for the equal status conditions, and a three-group multilevel path analysis for the unequal status conditions.

In the unequal status conditions (IM, GI, and WM), Status was entered on the individual level as a dummy code to differentiate high and low status participants. Though individuals were nested in groups according to the design, random assignment meant that our manipulation was the only group-level variable operant on the model, and only present in the unequal wealth conditions. By coding this group status variable as a dummy code and modeling paths from status to all other variables in the model, in effect we produce path weights that describe the moderation of the individual-level model by group status.

We thus produced two models. The first model shows the difference in the model fit and parameter estimates across group distinctiveness conditions (masked vs visible groups) for equal size and equal wealth groups (Figure 3). The second model shows the same across group size and group distinctiveness conditions under the three conditions of group inequality (Figure 4). Overall, this design allows us to compare the structure (path pattern) of the process of group identification through individual differences, behaviors, and outcomes, across our structural conditions, and demonstrate empirically our hypothesis that the process of identification incorporates all three influences and that that process is responsive to structural changes in the intergroup setting.

In order to ensure that the two multi-group clustered analyses were obtaining reliable model fit comparisons between group models, we tested a model for each condition separately. We do not report these independent models due to space constraints, but these are available from the authors upon request (OR ADD IN SUPPLEMENTARY APPENDIX ONLINE?). There were no deviations from the main findings we will now outline when the conditions were modeled separately as opposed to using our approach.

## Results

### Descriptives and Transformations

Our measure of group identification was unidimensional and generally reliable across conditions in both pretest and posttest waves (Cronbach’s alphas = .81 - .93). Mean group identification was not significantly different across the five conditions, for both pre (M = 4.2 - 4.5, SD = 1.4 - 1.9) and post-test (M = 4.3 - 5.0, SD = 1.6 - 1.9) measures. We found the strongest overall trend towards increased group identification in the wealthy minority condition, pre-test ID M = 4.2, post-test ID M = 5.0 (see Figure 2 for a comparison of pre and post-test identification across conditions and groups).

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Insert Figure 2 about here

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All variables showed some mild skewness and/or kurtosis. However, the restricted maximum likelihood estimator is fairly robust to these violations of assumptions (Muthén & Muthén, 2014).

Ingroup favoritism means differed reliably across conditions, F(4,275) = 11.94, p < .001. Post-hoc tests showed that the lowest mean for Ingroup Favoritism occurred in the Intergroup Inequality (GI) condition, and the highest in the Intragroup Mobility (IM) condition (see Figure 3). Outgroup Aid also differed significantly across conditions, F(4,275) = 23.37, p < .001. The highest proportion of outgroup receipts was in the GI condition, and the lowest in the IE, GE, and IM conditions (Figure 3).

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Insert Figure 3 about here

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In terms of token changes, due to the fact that this is a closed system of exchange, condition averages are zero and thus cannot be compared. In other words, the number of tokens is fixed and compositional across players, such that an increase for one player means a decrease for another, and within games these average out to zero. But, looking at standard deviations in the change in number of tokens each person experienced in each game, rather than the means, we found that inequality was relatively low and similar among players in the IE and GI conditions, whereas the other conditions showed increased intergroup inequality, particularly under the IM condition (see Figure 3). Levene’s test across all conditions showed a significant difference between these variances. There are no accepted protocols for posthoc analyses with multivariate Levene’s tests (see Table X below). However, separate Levene’s tests on the unequal conditions and the equal conditions separately, showed that there were no significant differences between the conditions where groups were unequal (Table Xb below), and a significant difference between the IE and GE conditions (GE showed significantly higher inequality; Table Xc below). IE may be said to show significantly lower inequality than all other conditions, which can be interpreted as not reliably different, on the basis of these analyses (see also Figure 3). Additional two-way contrasts would increase the likelihood of Type-II error and the pattern is clear from these three Levene’s tests.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Test of Homogeneity of Variance of Token Change across all Conditions** | | | | | |
|  | | Levene Statistic | df1 | df2 | Sig. |
| Token change | Based on Mean | **10.235** | **4** | **275** | **.000** |
| Based on Median | **9.815** | **4** | **275** | **.000** |
| Based on Median and with adjusted df | **9.815** | **4** | **142.749** | **.000** |
| Based on trimmed mean | **10.200** | **4** | **275** | **.000** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Test of Homogeneity of Variance of Token Change across Unequal Conditions** | | | | | |
|  | | Levene Statistic | df1 | df2 | Sig. |
| deltaTokens | Based on Mean | **.724** | **2** | **165** | **.487** |
| Based on Median | **.659** | **2** | **165** | **.519** |
| Based on Median and with adjusted df | **.659** | **2** | **102.743** | **.520** |
| Based on trimmed mean | **.713** | **2** | **165** | **.491** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Test of Homogeneity of Variance of Token Change across Equal Conditions** | | | | | |
|  | | Levene Statistic | df1 | df2 | Sig. |
| deltaTokens | Based on Mean | **16.076** | **1** | **110** | **.000** |
| Based on Median | **10.810** | **1** | **110** | **.001** |
| Based on Median and with adjusted df | **10.810** | **1** | **100.159** | **.001** |
| Based on trimmed mean | **14.628** | **1** | **110** | **.000** |

Table X. Levene’s tests of homogeneity of variances across all conditions (a) and across the unequal (b) and equal (c) subsets of conditions. See also Figure 3 for visualization of the variance descriptive in each condition.

### Process Models

We set out to explore the effect of individual differences and three different explanations of the process of group identification in different structural conditions, as described in the conceptual background above (see Figure 1). The exploratory model predicts that post-test group identification is a function of individual differences in identification prior to exposure to intergroup interaction, and that intergroup behavior between the measurements (performative identification), and individual outcome (extent of success or failure in increasing token balance; interdependence) mediate this effect.   
In other words, initial identification affects inter- and intra-group behaviors and proximate individual outcomes which, in turn, shape subsequent identification. We tested this overall model on the data gathered using two multi-group multilevel path analyses. The first assessed the model of identification just described under the inter-individual and intergroup conditions of wealth equality (IE and GE). The second did the same, but placed group status as a dummy code moderating independent variable with paths to all other variables in the model (Figures 3 & 4). We found that using both multi-group and independent multilevel path analysis procedures, our model of group identification best fit the IM and especially the GI conditions rather than the GI condition when groups were unequal. The overall model fit the GE condition better than the IE condition when groups were equal in wealth (see chi-square contributions, Figures 3 & 4).

**Equality**

The overall model for the two-group path analysis of the equal wealth conditions showed relatively good fit when including all the variables (see Figure 3) reflecting the divergent associations with that variable between the two groups analyzed. All modification indices were below 10, further supporting the fit. However, generally, in multigroup models where one group is expected to fit less well than another, a wider range of fit is to be expected, and was observed here. The fit for the model describing the GE condition was better than for the IE condition, based on each grouping’s chi-square contributions to the overall model (see Figure 3; Muthén & Muthén, 2014).3 Discussion of the relative contributions of each of the group models to the overall model fit is a cornerstone of this type of approach, and will be covered in the next section.

The first group model we present is that of the positive control – the IE condition. In this condition, we found that intergroup behavior does not affect post-test group identification. Only prior identification predicted post-test identification (Figure 3A).4

Group identity was visible and salient in the GE condition. However in this condition too, the ID prior was still the only reliable predictor of its post-test homologue (see Figure 2B). In contrast to the IE condition, Token Change was negatively predicted by pre-test identification, and positively by the proportion of aid received from the outgroup. All indirect effects to post-test identification were not significant.

Overall, when groups were equal in wealth and size, group distinctiveness was not sufficient to alter the process of identification over time, with individual differences in pre-test ID still being the only predictor of post-interaction ID. But, group distinctiveness did alter the dynamics of *outcome success*, through changes in individual differences in identification and the interdependence of outcomes on intergroup behavior (outgroup aid).

**Inequality**

In the unequal group wealth conditions, we had to account for the role of group status within each game. We created a dummy code (low status = 0; high status = 1) to do so, and incorporated it at the L1 level (see the variable Status in the path diagrams of Figure 4).

The overall model for the three-group path analysis of the unequal wealth conditions showed relatively good fit when including all the variables (for fit indices, see Figure 4). All modification indices for the full overall three-group model were below 10, further supporting the overall fit. However, in using this multigroup modelling approach, we expected the overall model fit to vary by condition, and so a wider range of fit, and differences in fit between the group models were to be expected, as was observed here. Discussion of the relative contributions of each of the group models to the overall model fit is a key aspect of our analytic approach.

The overall model had better fit when incorporating all variables (AIC=2146.8) compared to when the model excluded OGA (AIC=2359.5), IGF (AIC=2300.0), or both intergroup behaviors (AIC=2462.3). This indicates that these behavioral variables are necessary for modeling group identification across all three conditions. However, removing status (AIC=1613.2), or TC (AIC=964.99) improved overall model fit. This is to be expected when status and TC not only diverge in their direct impacts on post-ID across the different conditions, they also change the configuration of indirect effects in the model across conditions. In other words, the overall models without token change or status fit better because those two variables operate differently to achieve the same net result, relative to behaviors and post-ID, in different conditions. Supporting this interpretation, for the GI condition, the only condition in which both behavioral effects are mediated by TC, and in which status reliably directly predicted post-ID, the chi-square contribution to overall fit showed that the GI condition best fit the overall model (0.18), compared to the IM condition (0.461) and the WM condition (3.267) (see Figure 4; Muthén & Muthén, 2014).3

Figure 4 reports model fixed effect coefficients for each grouping, standardized by the residual standard deviation. The first sub-model we present for the unequal overall model is for the inter-individual mobility (IM) condition, where groups are not distinctive but are unequal in wealth and the same in size. In this condition, post-test identification is directly and positively predicted by TC (β=.57, p<.001), as well as by pre-ID (β=.26, p<.001; see Figure 4A). Group status marginally predicted post-test group identification directly (β=.25, p=.07). The group being identified with in this condition, given the non-distinctive groups demarcated only by initial wealth inequality, is the whole 14-player set of participants, in contrast to identification in the GE, GI, and WM conditions. As might be expected, then, a player with a better starting position in this “free market”-like intragroup context identified slightly more with the group.

The effect of being a member of the wealthy group on group identification was marginally mediated by intergroup behaviors (IGF: indirect β=.15, p=.08; OGA: indirect β=.04, p=.07) and reliably by the resulting TC (indirect β=-.25, p=.02). Both IGF and TC were moderated by the group status dummy variable, such that rich groups were less ingroup biased in their giving (β=-.39, p=.003), and gave more tokens/gained less tokens (β=-.45, p=.003) over the course of the game.5 The three-step mediation from being in the high status group, to outgroup aid, to TC, to group identification was unreliable (indirect β=-.01, p=.49). On the other hand, the three-step mediation from being in the high status group, to ingroup favoritism, to TC, to group identification was reliable (indirect β=-.11, p<.001). In other words, class-favoring behaviors and better outcomes predicted increased identification for low status groups but decreased identification for high status groups. Unearned riches in this situation allowed high status individuals to gain positive distinctiveness by and empowerment from generosity. From a different viewpoint, one could argue that the increase in identification could be a result of perceiving the loss of tokens at the end of the game and a realization of this common fate for their group. Our data do not support either explanation over the other empirically.

Overall, then, in the IM condition, identification was determined directly largely by outcomes (in terms of token change), with smaller/less reliable effects of intergroup behaviors, group status, and individual differences in prior identification. Intergroup behavior partially mediated the effect of individual differences in pre-test ID; in essence, initial identification hindered outgroup interactions and thereby amplified post-test ID for poor players, and vice versa for the wealthy players.

The second submodel describes the intergroup inequality (GI) condition, where both groups are the same size, and groups are distinctive and unequal (Figure 4B). In this condition, post-test identification was also directly and positively predicted by TC (β=.52, p<.001) as well as initial identification (β=.40, p<.001). We found the same indirect effects from group Status and IGF as we saw in the IM condition, except that IGF did not mediate pre-test ID’s effect on post-test ID (indirect β=.01, p=.68). The indirect effect of being in the high status group on post-ID through TC was reliable (indirect β=-.41, p<.001). Giving away tokens increased identification for the high status players to the extent that it decreased their net outcome, while the converse was true for low status players.

Since the OGA to post-ID and IGF to post-ID paths are unreliable in this condition, indirect effects through these behavioral variables cannot be considered true mediations (Baron & Kenny, 1986). However, both IGF (indirect β=.13, p=.02) and OGA (indirect β=-.12, p=.02) predicted post-ID indirectly through TC. This effect was moderated by Status. The indirect effect of being in the rich group through Ingroup Favoritism to Token Change to group identification (indirect β=-.07, p<.001) was again reliable. Being in the rich group decreased both intergroup behaviors, but as the two behaviors had opposing and roughly equal effects on outcomes (-.23 vs .24), the summary effect of the two together on identification through TC is close to zero.

Finally, we found that in the GI condition simply being in the high status group increased identification with that group (β=.47, p<.001). This is the only condition in which we see a medium-sized reliable direct effect of Status, as well as a reliable indirect effect of Outgroup Aid during gameplay on group identification, such that a lower proportion of aid from the outgroup (or higher proportion of aid from the ingroup) to a player was associated with better individual outcomes for that player, and thereby increased identification. It confirms classic SIT findings regarding status and identification, namely, that belonging to a high status category promotes group identification (see e.g., Ellemers, 2002).

Overall, then, identification in the inequality condition was directly predicted by individual differences in initial ID, individual outcomes (token change), and status, but not directly by intergroup behaviors. Individual behaviors predicted identification only indirectly through their opposing effects on individual outcomes, for a negligible total effect of the two behaviors on identification.

The final submodel we present is that describing the wealthy minority (WM) condition, where groups are unequal in both size and wealth, and groups are distinctive. Group Status did not predict post-test group identification (β=.20, p=.11). And, for the first time, we also see a reliable indirect effect of ingroup favoritism (IGF) during game play on post-game group identification, as well as an indirect effect such that increased IGF is associated with better individual outcomes (more positive TC), which in turn increases identification (indirect β=.27 p<.001). Higher prior identification, which in turn predicted higher post-test ID (indirect β=-.05, p=.04).

Also, in contrast to all other conditions, TC was a negative predictor of post-test identification in this condition. That is, the more tokens participants in the high status group lost over the course of the game, the more identified they were with their group, and this behavioral effect on post-test ID was independent of pre-test ID. That is to say that, in the minority condition, people identified more with their group to begin with if they were in the high status condition, but as they gave more than they received over the course of the game, became more comfortable with their group identity, implying an implicit egalitarian assumption of illegitimacy. Supporting the latter interpretation, contrary to the GI model, both Ingroup Favoritism and Outgroup Aid in the IM condition were directly associated with post-test identification. The effect of ingroup favoritism was uniquely moderated by status such that higher ingroup favoritism increased identification for low status players and decreased it for high status players. Both indirect effects of group Status through Ingroup Favoritism (indirect β=-.25, p=.01) and Outgroup Aid (indirect β=-.03, p=.01) to post-test identification were reliable. Furthermore, the 3-step mediation from group Status to Ingroup Favoritism to Token Change to group identification was reliable (indirect β=.03, p=.01). In other words, in this condition, high status groups are less ingroup biased in their giving, and received a lower proportion of their granted tokens from the ingroup than from the outgroup. This combination of higher proportions of their tokens coming from the outgroup and less ingroup giving (followed by less Token Change), increased high status players’ identification, whereas the opposite effects directed increases in low status group identification. For low status groups, ingroup favoritism was the only strategy to improve collective outcomes agentically, with outgroup aid not contributing significantly to improvement of individual outcomes among the low status groups, possibly due to the diffusion of such aid over the numerically superior low status group. Thus, behavioral and interactive outcome effects were the uniquely dynamic elements in the construction of group identification under the structural configuration of the minority condition in contrast to the other conditions. This suggests that as the size of the rich group decreases, the inertial effects of paternalistic giving may be reduced.

Overall, then, in the minority condition, individual differences in ID, intergroup behaviors, outcomes, and status (marginally), all directly predicted post-ID. And behaviors were particularly unique in the way they impacted identification compared to other conditions, as opposed to status or individual differences.

# Discussion

Psychological attributes are neither determining of behaviors nor determined by situations; but situations provide affordances for action/interaction that are psychologically consequential. The only way to make this case empirically is to use evolutionary methods – which we have done. Our models show how initial levels of group identification and group status predict (1) intergroup behavior of the actors (IGF), (2) intergroup behaviors toward the actor (OGA) and, (3) personal outcomes of the actor; and that these, in turn, affect post game social identification. Moreover, the whole model of influence works differently under different structural conditions of interaction. Contrast this with the way social identification is typically studied – as a predictor of one type of outcome, or (less commonly) as the outcome of a priming or situational manipulation.

The results showed that, contrary to previous social identity theory findings (Ellemers, 1993), our structural manipulations did not elicit mean-level differences in group identification in and of themselves. We found no reliable mean differences in identification across the experimental conditions in either the pre or post-test measures. However, the inequality model did show that being in a high status group directly predicted increased identification after the game under those conditions, supporting the basic SIT prediction in that regard, but the status moderation also showed that this occurred not through satisfaction with the group’s superior status as classic SIT literature would predict, but through aiding the low status group and decreasing inequality.

In terms of process, results indicated that when groups were equal in wealth and size, intergroup behavior and individual outcomes were irrelevant to group identification, regardless of whether the groups were distinctive (permeable). Furthermore, we showed that when groups were distinctive but equal in wealth and size, (prior) identification led to decreased outcome success. This latter effect suggests that the irrelevance of behavior and outcomes to identification in this equality condition is not a failure of the manipulation. Group category/identity is masked in the equal wealth conditions, so any observed ingroup favoritism in these conditions can be attributed to geographic positioning or self-giving. This would explain the poor model fit for this submodel and the fact that group behavior does not predict identification. Initial identification with being a member of the experimental game was the only predictor of identification at the end of the game. This is supportive of social identity theory’s qualification that groups need to be distinctive in order for identity to form, strengthen, and be salient in attitudes and behavior (Tajfel & Turner, 1979). In this condition, then, inductive identity formation is not at play, at least not through our observed mediators. The fact that the overall model better fit the equality than the individual condition, further shows how the theoretical assumptions of SIT are better suited for conditions in which groups are distinctive.

Inequality itself was not a cause of either increased ingroup favoritism or decreased altruism. And contrary to social dominance theory (Sidanius & Pratto, 1999), inequality was not self-reinforcing in all hierarchical structural conditions. Inequality was reinforcing in some conditions, however, even when the modal behaviors were directed towards hierarchy attenuation (equalizing outcomes). In fact, in the inequality condition, where groups were unequal in wealth but equal in size, ingroup favoritism was lower, and outgroup aid was higher, than in any other condition (See Table 1). It was in the free market (unequal, permeable) and minority (unequal, exclusive) conditions that ingroup favoritism and inequality in outcomes were highest. This, suggests that both group size and collective mobility impact ingroup favoritism. Looking more closely, high status minorities reinforce the categorization implicit in status differences (an implicit categorization recognized by participants in the free market condition, evidenced through their ingroup identification and ingroup favoritism despite the absence of distinctive group boundaries, relying only on status differences to delineate group boundaries). Permeability, on the other hand, while decreasing categorization, increases outcome relevance and interdependence across status lines as it increases mobility expectancies. The tendency for increased ingroup favoritism, decreased outgroup aid, and increased outcome inequality in the free market and minority conditions comes despite the fact that in these and all unequal conditions, high status groups apparently considered the situation illegitimate, and were more likely to try to equalize the differences rather than widen them, on average.

Contrary to SIT predictions, group permeability permitting individual mobility did not reduce group identification, even for low status players. These results can only then be explained, as we have done, by integrating both categorization and interdependence dynamics in our understanding of the production of identity performance and through that, the (re)creation of ingroup identification.

When one adds legitimacy of inequality as a further factor, social identity theory argues that high status minority people with initially high identification, in unstable, illegitimate conditions will tend to show the most consequent ingroup identification and intergroup bias (Ellemers et al., 1993). But, Ellemers et al. (1993) make a distinction between illegitimate group status (the assignment of a group collectively to low status) and illegitimate ***personal*** status (i.e. the assignment of an individual to a group with low status). They show that people identify less with their low status group when they are assigned personally to that group. Or, in the authors’ terms (Ellemers et al., 1993): “when belonging to a group that has low status is the consequence of the way one has been treated ***personally,*** group members in the illegitimate condition contest their association with this group.”

An examination of the effect of status on token change across unequal conditions shows that people in high status groups gave away the most (relative to what they received) in the inequality condition. The path weight from status to token change is larger in absolute value in the inequality condition than in other conditions. This was also the condition in which people saw the situation as the most *personally* illegitimateof the unequal wealth conditions(see also Ellemers et al., 1993), with low status dissociating people from group identification under this condition, but not in the free market condition and only marginally in the minority condition. Players gave away less over time in the free market condition, and overall collectively neither gave away nor gained tokens in the minority condition (Figure 4). Thus, even when groups recognize an illegitimate inequality and act to correct it (Rubin, Badea & Jetten, 2014), structural aspects of the context determining more nuanced perceptions of this illegitimacy (here, group distinctiveness (permeability) and sizes) can change the degree to which intergroup discrimination happens and inequality is reinforced.

Additionally, we found that when groups were unequal in wealth, group distinctiveness and size both caused changes in the way group identification occurred. Under the free market condition, when groups were not distinctive, both intergroup behaviors and token change, as well as pre-test ID, influenced post-test ID. Both ingroup favoritism and outgroup aid during the game caused higher post-ID for low status groups, but this was moderated by group status, with opposite effects for high status groups. However, when groups *were* distinctive, in the inequality condition, group status directly predicted post-ID, with high status groups showing more post-test identification. Moreover, intergroup behaviors only indirectly predicted post-ID, through those behaviors’ effects on token change. Thus, we see that under condition of illegitimate assignment of individuals to pre-defined high and low status groups, intergroup behaviors were more associated in the indistinct groups free market condition with post-ID, whereas in the inequality condition, individual outcomes and collective status are more important determinants of post-ID given established, distinctive groups.

The shift from direct to indirect influence of intergroup behaviors on post-identification once groups are defined underscores the role of such behaviors in defining group identities when they are relatively indistinct. The two observations that, a) when groups were distinct the effect of intergroup behaviors on identification was routed through their effects on outcomes, and b) across all unequal conditions outcomes influenced identification, are consonant with situated cognition’s central tenet; that psychology is for action adapted to situation. We find evidence of interactions between perception (identity), action (intergroup behavior), the environment (condition), and other agents, during goal achievement (e.g., Smith & Semin, 2004). Different processes are involved in ingroup identification of high and low status groups in these unequal wealth conditions – high status groups strengthen their identification by sacrificial generosity whereas low status groups strengthen identification by gain. And sometimes this process occurs in parallel with structural and individual difference supports for group identification. In all unequal conditions, moreover, the results support the relevance of both categorization (ID, status) and interdependence (outcomes), with degrees of impact and mediational pathways across structural conditions varying with the congruency between group membership and outcome interdependence, supporting Stroebe et al.’s (2015) theoretical integration of social identity theory and interdependence of fate.

This is also consistent with the Situated Focus Theory of Power (e.g., Willis & Guinote, 2011), in that we find that power, as wealth, has two major effects on goal pursuit: it affects the direction of behavior (i.e., the content of goals), and the ways people pursue their goals (i.e., goal initiating and striving). However, contrary to this and other theories of power, as well as social dominance theory, power-holders were not behaviorally oriented towards hierarchy enhancement.

In our experimental situations, inequality produces compensatory behavior observed by both high and low status groups, leading to divergent interactions between status and individual outcomes on post-ID across conditions. Both high and low status groups aimed to reduce inequality. We find high status groups engaging in the goal of hierarchy attenuation by giving away their surpluses to the low status group, and linking identification to their degree of generosity, across all but the rich minority conditions. We see low status groups giving to each other and taking from the high status group, and linking positive outcomes to more identification, again, except in the minority condition. Thus, the claim that some have made that once power-holders attain power, they choose to pursue personal goals rather than goals that serve their subordinates (e.g., Gruenfeld, Inesi, Magee, & Galinsky, 2008; Keltner, Gruenfeld, Galinsky, and Kraus, 2010; Willis & Guinote, 2011), is not as context-sensitive and bounded as it should be.

We see that the effect of ingroup favoritism on individuals’ outcomes is smallest in the inequality condition, and that having a higher proportion of tokens received from outgroup aid actually worsens outcomes for low status groups in the same condition. The unexpected effect of outgroup aid on outcomes in this condition may be due to excessive reciprocation by low status group members. Indeed, the converse of this effect, for high status groups, shows that high status groups benefit from outgroup aid in this condition. Overall however, high status groups gave away by far more of their tokens to the outgroup relative to low status groups in this condition than in others, and low status players gave far more to each other than to the outgroup. These observations help to explain, from an adaptive point of view, why there is overall less ingroup favoritism, more outgroup aid, and the least inequality of outcomes in the inequality condition than in other conditions. That is, under the inequality condition, ingroup favoritism is less effective at improving outcomes, and receiving outgroup aid is costly to those who need it, and a large high status group is consistently and reliably altruistic, decreasing social risk. In such a context, group behaviors are less relevant to both individual outcomes and group identity, and we see this in contrasting the inequality condition to the free market or minority conditions. The direct path from status to post ID is structural whereas the indirect effects through token change shows process: giving tokens to the poor group and not receiving an equal amount in return becomes a form of ‘sacrificial generosity” that boosts identification of high status group members.

Furthermore, generosity from the high status group might make the low status identity salient and the persistence of inequality in the face of generosity from the high status group might reduce perceptions of illegitimacy, making dis-identification with the low status group the only viable solution to maintain positive self-evaluations in the face of continued inequality. However, we do not see direct evidence of disidentification in this condition (see Figure 2a). One possible explanation of this is that instead of altering identification, this manipulation changes the performance and purpose/connotations of identification. Low status group players are acting more as individuals and high status group players are acting more collectively, as group members, in their efforts to reach a harmonious distribution of resources and a positive delineation and interpretation of group boundaries. This would be a counter-intuitive and intriguing possibility that needs to be followed up with additional research.

Adding the final manipulation, making the wealthy group a minority, we see that both status (marginally) and intergroup behaviors are relevant to post-ID. Unlike the other unequal wealth conditions, status does not affect outcomes in the minority condition, meaning that individuals in either status group neither gained nor lost tokens on average relative to each other. This indicates that post-test identification for both low and high status groups in this condition was less dependent on outcomes and more tied to process (in terms of identity performance, e.g., reciprocal altruism).

Nonetheless, the minority condition produced one of the highest emergent levels of inequality of outcomes. This is in line with SIT predictions regarding categorization, as discussed above, as well as with interdependence and bounded reciprocity predictions. The latter are supported given that the structural effect of a smaller wealthy group is to restrict the exchange of high status social coordination into material equalization with the larger low status group. This occurs as the low status group reciprocates to the outgroup only part of the time and with variation between ingroup members, and since the larger number of low status agents (in need) involved in reciprocation is sufficient to overcome the use of ingroup favoritism for outcome improvement by low status agents.

There are other perspectives that would be generative to take in interpreting the results of this exploratory study and extrapolating to future research. One such perspective emphasizes power dynamics. It is argued, for example, that there are different forms of power, and that concepts such as status, seen as distinct from control over outcomes, and are actually forms of power that are interchangeable with others, such as wealth (e.g., Power Basis Theory, Pratto & Bou Zeineddine, 2015). Illegitimate status is more materially and psychologically costly to want to maintain, even for high status groups in some circumstances, because legitimacy is itself a form of power that serves to fulfill human needs, and therefore is embedded in social motivation (e.g., Pratto & Bou Zeineddine, 2015). Another example of the relevance of power research, is the general tendency for power and status to be self-reinforcing (e.g., Sidanius & Pratto, 1999; Magee & Galinsky, 2008). Yet another debate this study begins to address is the claim that powerful people are more intrapsychically than contextually influenced (Galinsky, Magee, Gruenfeld, Whitson, & Liljenquist, 2008). Future iterations of this design and others need to pursue and test such alternative theoretical perspectives on identification dynamics’ structural moderations against the explanations from SIT and interdependence theory put forward here.

Our results overall strengthen the case for describing social identification as situated, where people (a) continuously make sense of their position in a social system, and (b) act adaptively by making use of the individual and collective resources in relation to their constraints. Grand predictions from various theoretical models are subject to specific features of social situations.

Power is critical to this: one of the clear findings from these results is that people cannot just do what they want; their situated identity is subject to individual and group power. "Adaptively" may mean many things, and as this study shows, can be oriented to giving resources away in the interests of collective fairness or accumulating resources for individual gain. This perspective requires us to mare carefully consider process and what Cherry calls the stubborn particulars of situations to understand how people will make sense of social situations in ways that inform their identities.

There are many theoretical implications of this argument. One important message for social identity theory is that is incorrect to assume that high ingroup identification will always result in people acting in favour of their own group to the detriment of others; behaviour supports ingroup identification (and vice versa) via emergent and situated individual and group norms (e.g., an emergent norm of charity from the high status group). The interactionist version of SIT (e.g. Reicher, Haslam, and colleagues, XXX) considers ingroup identification to be both an achievement that people might pursue for its own sake and an important basis for social and material power and interdependence.

There are several limitations to this study. It is arguable whether groups that are unequal but undemarcated are not distinctive. The manipulation of group size was not fully crossed with the equality and distinctiveness manipulations. The measures of ingroup favoritism and outgroup aid are only part of a complex behavioral pattern mediating identification over time for these groups. Group-level outcomes were not assessed in the same way that individual outcomes were. Future research would also do well to attempt to replicate these findings in naturalistic settings, for example, by combining comparative political and political psychological data to assess the impacts of the structural changes we operationalize experimentally here on arbitrary-set group identification.

# References

Doosje, B., Ellemers, N., & Spears, R. (1995).Perceived intragroup variability as a function of group status and identification. *Journal of Experimental Social Psychology*, *31*, 410-436.

Durrheim K, Quayle M, Tredoux CG, Titlestad K, Tooke L (2016). Investigating the Evolution of

Ingroup Favoritism Using a Minimal Group Interaction Paradigm: The Effects of Inter- and Intragroup Interdependence. *PLoS ONE*, 11 (11): e0165974. doi:10.1371/journal.pone.0165974

Ellemers, N. (1993). The Influence of sociostructural variables on identity management strategies.

*European Review of Social Psychology, 4,* 27-57.

Ellemers, N., Wilke, H., & van Knippenberg, A. (1993). Effects of the legitimacy of low group or

individual status on individual and collective status-enhancement strategies. *Journal of Personality and Social Psychology, 64.,* 766-778.

Ellemers, N., Spears, R., & Doosje, B. (1997). Sticking together or falling apart: In-group identification

as a psychological determinant of group commitment versus individual mobility. *Journal of Personality and Social Psychology, 72,* 617-626.

Ellemers, N., Spears, R., & Doosje, B. (2002). Self and social identity. *Annual Review of Psychology*, *53*,

161-186.

Ellemers, N., van Knippenberg, A., de Vries, N., & Wilke, H. (1988). Social identification and

permeability of group boundaries. *European Journal of Social Psychology*, *18*, 497-513.

Gaertner, L., & Insko, C. A. (2000). Intergroup discrimination in the minimal group paradigm:

Categorization, reciprocation, or fear? *Journal of Personality and Social Psychology*, *79*, 77–94. doi:10.1037/0022-3514.79.1.77

Galinsky, A. D., Magee, J. C., Gruenfeld, D. H., Whitson, J. A., & Liljenquist, K. A. (2008).

Power reduces the press of the situation: implications for creativity, conformity, and dissonance. *Journal of Personality and Social Psychology*, *95*, 1450-1466.

Gruenfeld, D. H., Inesi, M. E., Magee, J. C., & Galinsky, A. D. (2008). Power and the

objectification of social targets. *Journal of Personality and Social Psychology*, *95*, 111-127.

Hogg, M. A., (2016). Social identity theory. In S. McKeown, R. Haji & N. Ferguson (Eds), Understanding peace and conflict through social identity theory (pp. 3-17). Springer.

Keltner, D., Gruenfeld, D. H., Galinsky, A., & Kraus, M. W. (2010). Paradoxes of power:

Dynamics of the acquisition, experience, and social regulation of social power. In A.

Guinote & T. K. Vescio (Eds.), *The Social Psychology of Power* (pp. 177-208). New York,

NY: Guilford Press.

Klein, O., Spears, R., Reicher, S. (2007). Social identity performance: Extending the strategic side of

SIDE. *Personality and Social Psychology Review*, *11*, 28-45.

Oakes, P. J., Haslam, S. A., & Turner, J. C. (1994). *Stereotyping and social reality*. Oxford: Blackwell.

Platow, M. J., Grace, D. M., & Smithson, M. J. (2012). Examining the preconditions for psychological

group membership: Perceived social interdependence as the outcome of self-categorization. *Social Psychological and Personality Science. 3*, 5-13. DOI: 10.1177/1948550611407081

Pratto, F. & BouZeineddine, F. (2015). Politics and the Psychology of Power: Multi-level Dynamics in

the (Im)Balances of Human Needs and Survival. In Forgas, J., Fiedler, K., & Crano, B. (Eds.), *Social Psychology and Politics,* Psychology Press, Brighton, UK*.*

Magee, J. C., & Galinsky, A. D. (2008). 8 Social Hierarchy: The Self‐Reinforcing Nature of Power and

Status. *The Academy of Management Annals*, *2*, 351-398.

Rabbie, J. M., Schot, J. C., & Visser, L. (1989). Social identity theory: A conceptual and

empirical critique from the perspective of a behavioural interaction model. *European Journal of Social Psychology*, *19*, 171-202.

Reicher, S., & Haslam, S. A. (2013). Towards a 'Science of Movement': Identity, authority and influence

in the production of social stability and social change. *Journal of Social and Political Psychology*, *1*, 112–131. doi:10.5964/jspp.v1i1.266

Reynolds, K. J., Turner, J. C., Haslam, S. A., & Ryan, M. K. (2001). The role of personality and group factors in explaining prejudice. *Journal of Experimental Social Psychology*, 37, 427-434. doi:10.1006/jesp.2000.1473

Rubin, M., Badea, C., & Jetten, J., (2014). Low status groups show in-group favoritism to compensate for

their low status and compete for higher status. *Group Processes & Intergroup Relations*, *17*, 563-576. DOI: 10.1177/1368430213514122

Sherif, M., & Sherif, C. W. (1966). Formation of outgroup attitudes and stereotypes: Experimental verification (pp. 271-295). *Groups in harmony and tension.* New York Octagon Books.

Sidanius, J. & Pratto, F. (1999). *Social dominance theory: A theory of oppression and dominance*. New York: Cambridge.

Smith E.R., Semin, G.R. (2004). Socially situated cognition: cognition in its social context. *Advances in*

*Experimental Social Psychology, 36*, 53–117.

Tajfel, H. & Turner, J. (1979). An integrative theory of intergroup conflict. In S. Worchel & W.G. Austin

(Eds). *The Social Psychology of Intergroup Relations*. Monterey, CA: Wadsworth*.*

Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behavior. In S. Worchel &

W.G. Austin (Eds). *Psychology of Intergroup Relations.* Chicago: Nelson.

Terry, D. J. & O’Brien, A. T. (2001). Status, Legitimacy, and Ingroup Bias in the Context of an Organizational Merger. *Group Processes Intergroup Relations*, *4*, 271. DOI:0.1177/1368430201004003007

Thomas, E. F., McGarty, C., & Louis, W. (2014). Social interaction and psychological pathways to political engagement and extremism. *European Journal of Social Psychology*, *44*, 15–22.

Thomas, E. F., McGarty, C., & Mavor, K. (2016). Group interaction as the crucible of social

identity formation: A glimpse at the foundations of social identities for collective action. *Group Processes & Intergroup Relations*, *19*, 137-151.

Turner, J. C., & Bourhis, R. Y. (1996). Social identity, interdependence, and the social group: A reply to

Rabbie et al. In W. P. Robinson (Ed.), *Social groups and identities: Developing the legacy of Henri Tajfel.* London: Butterworth-Heinemann. (pp. 25-64).

Turner, J., & Reynolds, K. (2002). The Social Identity Perspective in Intergroup Relations: Theories, Themes, and Controversies. In R. Brown & S. Gaertner (Eds), *Blackwell Handbook of Social Psychology: Intergroup Processes* (pp. 133-152). Malden, MA: Blackwell. 10.1111/b.9781405106542.2002.00009.x

Willis, G. B., & Guinote, A. (2011). The effects of social power on goal content and goal striving: A

situated perspective. *Social and Personality Psychology Compass*, *5*, 706-719.

**Endnotes**

1. The racial categorizations, black, white, Indian, and coloured are contested apartheid designations which are still common parlance.
2. There are several reasons for which we did not fully cross the group size manipulation with the other experimental factors. First, the results cannot be simply analyzed with a factorial method, therefore adding the missing cells would add unnecessary complexity. Second, there are compelling conceptual reasons not to include certain conditions. For example, when groups are the same colour (non-distinctive) and have the same starting tokens (equal status) then groupness cannot be inferred from size (since there is no way to perceive group size). Third, some conditions are simply less common or dynamic in real world contexts and are therefore of less interest for our purposes of modeling different intrasocietal socioeconomic macrostructures’ impact on group identification and intergroup economic behavioral dynamics. For example, it is unusual to find two numerically asymmetric groups that are also unequal in status but that are non-distinctive in terms of boundaries. Similarly, it is unusual to see distinctive asymmetrically sized groups that are equal in status, though, of course, many exceptions exist. Finally, due to the nested nature of the data and the complexity of this method, there was need to conserve power in the research design. Since the Intergroup Equality condition serves as a control condition for status and group size manipulations independently, depending on the specific contrast done with the other conditions, and given the above reasons, three conditions derived from crossing the group size manipulation with the status and distinctiveness manipulations were dropped from the design (see Table 1).
3. We determine the best fitting model by comparing chi-square contribution of each model to the overall multigroup complex data model. The larger the chi-square contribution the worse the fit of the overall model.
4. The results beg the question of why the relationship between OGA, IGF, and TC differed from chance levels when there was no way of inferring assigned group status from visible information. The most likely reason is that self-giving affected IGF, OGA, and resulting TC.
5. Paths from the binary variable status are interaction terms, since low status is coded as 0 and high as 1.All paths are multiplied by it in producing indirect effects estimates in MPlus, which give the weight of the interaction term and its p-value.

Post-test identification

Token change (TC)

Outgroup Aid (OGA)

Ingroup Favoritism (IGF)

Group Status

Pre-test identification (ID)

Path Estimates

Varies by group

Invariant across groups

D Durable, F Fragile

ns not significant

No superscript p ≤ .15

\* p ≤ .05, \*\* p ≤ .001

**Bold** reliable group 95% CI contrast

Model Fit

χ2 (14) = 23.03, p = .06

Scaling Correction Factor for MLR: 1.3375

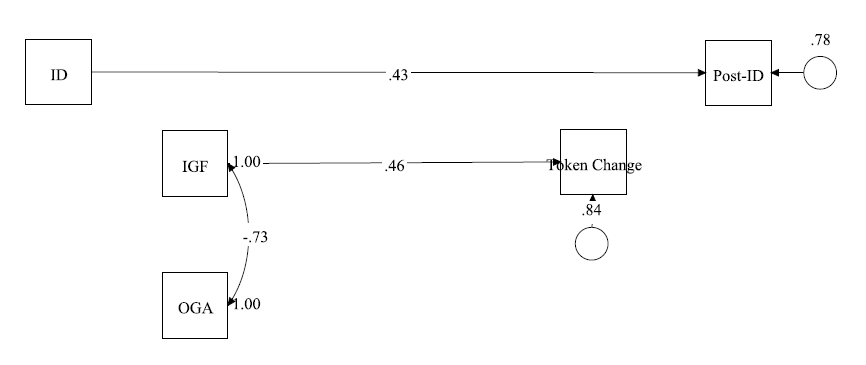
TLI = .952; CFI = .994

RMSEA = .028; pclose = .970

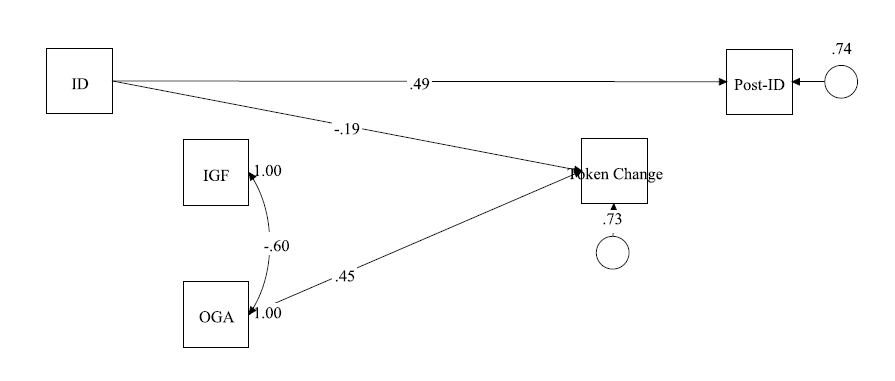
**Figure 1. Theoretical model outlining the temporal/causal directionality of predictions Group status is known to affect identification before and after interaction, as well as intergroup behaviors such as IGF (see Durrheim et al., 2016) and OGA. Collective status is also known to affect individual success (e.g., Sidanius & Pratto, 1999), operationalized here as net token change. We have hypothesized that individual differences in pre-test identification, intergroup behaviors, and token change will all play roles in the process of identification, but that they will have different roles and degrees of importance to post-test identification depending on the structural conditions manipulating interdependence and group (a)symmetries.**

**Figure 3. A) Intergroup behaviors [outgroup aid (OGA), ingroup favoritism (IGF)] by condition. Error bars denote +/- 1 SD. B) Token change inequality (std. deviation of token change per session/10) by conditions.**

1. **Inter-individual Equality (IE)**



1. **Intergroup Equality (GE)**



**Model Fit Indices**

*χ2(4) = 2.704\*, p=0.6*

*χ2 Contributions: IE = 2.340, GE = 0.365*

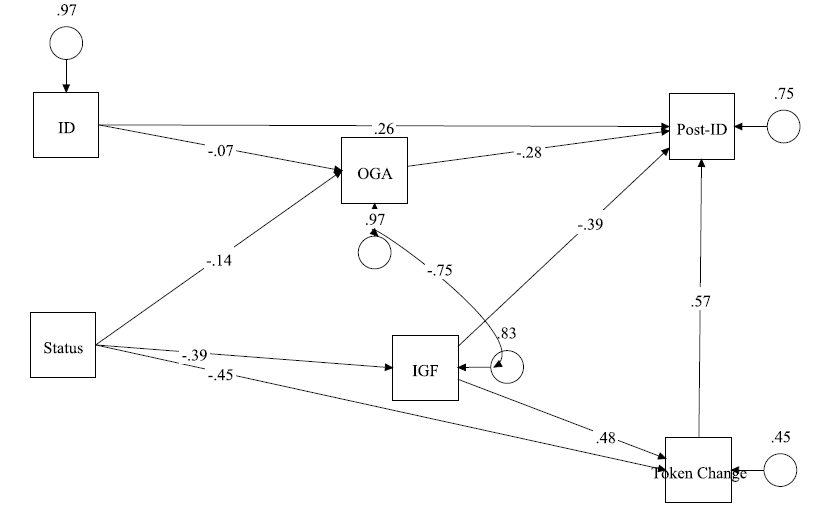
*RMSEA < 0.001, 90% C.I.: 0.000 - 0.169, pclose = 0.670*

*CFI = 1.000, TLI = 1.091*

*SRMR = 0.025*

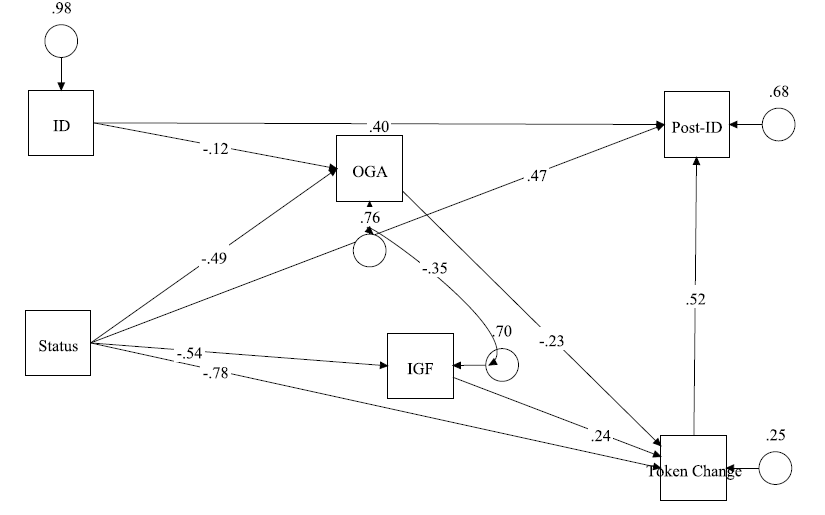
**Figure 3. Multi-group complex data model showing associations between identification and intergroup behavior and outcomes under the individual (A) and equality (B) conditions. All p’s < .05. The models show that when groups are equal in wealth, distinctive or not, intergroup behaviors and individual success are not predictive of identification. The models also show that making groups distinctive makes individual differences in prior identification as well as outgroup aid contributors to individual success.**

1. **Individual Mobility (IM)**

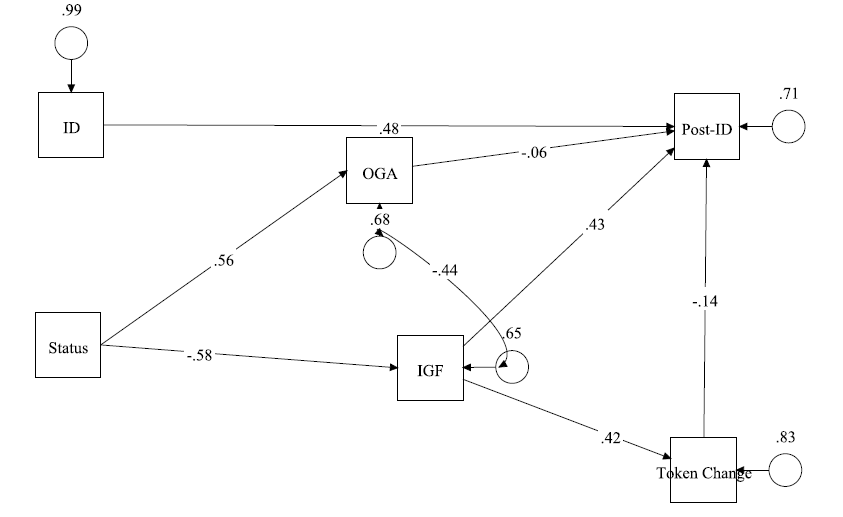


.25

1. **Intergroup Inequality (GI)**



**C) Wealthy Minority (WM)**



**Model Fit Indices**

*χ2(4) = 3.908, p=0.27*

*χ2 Contributions: IM = 0.461, GI = 0.18, WM = 3.267*

*RMSEA = 0.074, 90% C.I.: 0.000 - 0.248, pclose = 0.331*

*CFI = 0.996, TLI = 0.947*

*SRMR = 0.022*

**Figure 4. Multi-group complex data model showing associations between identification and intergroup behavior and outcomes under the individual mobility (A), intergroup inequality (B), and wealthy minority (C) conditions. Dashed lines indicate marginal paths (p=.05-.07). All other p’s < .05. The models show that intergroup behaviors are most predictive of identification in the IM and WM conditions though differently between the two, individual success most predictive and roughly equal in magnitude in the IM and GI conditions, and status is most predictive in the GI condition.**

**Tests for ID (equal groups conditions)**

|  |  |  |
| --- | --- | --- |
| **Between-Subjects Factors** | | |
|  | | N |
| condition | .00 | **56** |
| 1.00 | **56** |
| rich | .00 | **112** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptive Statistics** | | | | | |
|  | condition | rich | Mean | Std. Deviation | N |
| pretest ID mean | .00 | .00 | **4.4881** | **1.42979** | **56** |
| Total | **4.4881** | **1.42979** | **56** |
| 1.00 | .00 | **4.7440** | **1.54265** | **56** |
| Total | **4.7440** | **1.54265** | **56** |
| Total | .00 | **4.6161** | **1.48615** | **112** |
| Total | **4.6161** | **1.48615** | **112** |
| post ID mean | .00 | .00 | **4.2440** | **1.69907** | **56** |
| Total | **4.2440** | **1.69907** | **56** |
| 1.00 | .00 | **5.1429** | **1.68638** | **56** |
| Total | **5.1429** | **1.68638** | **56** |
| Total | .00 | **4.6935** | **1.74451** | **112** |
| Total | **4.6935** | **1.74451** | **112** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Multivariate Testsa** | | | | | | | |
| Effect | | Value | F | Hypothesis df | Error df | Sig. | Partial Eta Squared |
| stage | Pillai's Trace | **.032** | **3.623b** | **1.000** | **109.000** | **.060** | **.032** |
| Wilks' Lambda | **.968** | **3.623b** | **1.000** | **109.000** | **.060** | **.032** |
| Hotelling's Trace | **.033** | **3.623b** | **1.000** | **109.000** | **.060** | **.032** |
| Roy's Largest Root | **.033** | **3.623b** | **1.000** | **109.000** | **.060** | **.032** |
| stage \* gameno | Pillai's Trace | **.046** | **5.257b** | **1.000** | **109.000** | **.024** | **.046** |
| Wilks' Lambda | **.954** | **5.257b** | **1.000** | **109.000** | **.024** | **.046** |
| Hotelling's Trace | **.048** | **5.257b** | **1.000** | **109.000** | **.024** | **.046** |
| Roy's Largest Root | **.048** | **5.257b** | **1.000** | **109.000** | **.024** | **.046** |
| stage \* condition | Pillai's Trace | **.080** | **9.463b** | **1.000** | **109.000** | **.003** | **.080** |
| Wilks' Lambda | **.920** | **9.463b** | **1.000** | **109.000** | **.003** | **.080** |
| Hotelling's Trace | **.087** | **9.463b** | **1.000** | **109.000** | **.003** | **.080** |
| Roy's Largest Root | **.087** | **9.463b** | **1.000** | **109.000** | **.003** | **.080** |
| stage \* rich | Pillai's Trace | **.000** | **.b** | **.000** | **.000** | **.** | **.** |
| Wilks' Lambda | **1.000** | **.b** | **.000** | **109.000** | **.** | **.** |
| Hotelling's Trace | **.000** | **.b** | **.000** | **2.000** | **.** | **.** |
| Roy's Largest Root | **.000** | **.000b** | **1.000** | **108.000** | **1.000** | **.000** |
| stage \* condition \* rich | Pillai's Trace | **.000** | **.b** | **.000** | **.000** | **.** | **.** |
| Wilks' Lambda | **1.000** | **.b** | **.000** | **109.000** | **.** | **.** |
| Hotelling's Trace | **.000** | **.b** | **.000** | **2.000** | **.** | **.** |
| Roy's Largest Root | **.000** | **.000b** | **1.000** | **108.000** | **1.000** | **.000** |
| a. Design: Intercept + gameno + condition + rich + condition \* rich  Within Subjects Design: stage | | | | | | | |
| b. Exact statistic | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Mauchly's Test of Sphericitya** | | | | | | | |
| Measure: IDt | | | | | | | |
| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilonb | | |
| Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| stage | **1.000** | **.000** | **0** | **.** | **1.000** | **1.000** | **1.000** |
| Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix. | | | | | | | |
| a. Design: Intercept + gameno + condition + rich + condition \* rich  Within Subjects Design: stage | | | | | | | |
| b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table. | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Tests of Within-Subjects Effects** | | | | | | | |
| Measure: IDt | | | | | | | |
| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| stage | Sphericity Assumed | **4.851** | **1** | **4.851** | **3.623** | **.060** | **.032** |
| Greenhouse-Geisser | **4.851** | **1.000** | **4.851** | **3.623** | **.060** | **.032** |
| Huynh-Feldt | **4.851** | **1.000** | **4.851** | **3.623** | **.060** | **.032** |
| Lower-bound | **4.851** | **1.000** | **4.851** | **3.623** | **.060** | **.032** |
| stage \* gameno | Sphericity Assumed | **7.039** | **1** | **7.039** | **5.257** | **.024** | **.046** |
| Greenhouse-Geisser | **7.039** | **1.000** | **7.039** | **5.257** | **.024** | **.046** |
| Huynh-Feldt | **7.039** | **1.000** | **7.039** | **5.257** | **.024** | **.046** |
| Lower-bound | **7.039** | **1.000** | **7.039** | **5.257** | **.024** | **.046** |
| stage \* condition | Sphericity Assumed | **12.671** | **1** | **12.671** | **9.463** | **.003** | **.080** |
| Greenhouse-Geisser | **12.671** | **1.000** | **12.671** | **9.463** | **.003** | **.080** |
| Huynh-Feldt | **12.671** | **1.000** | **12.671** | **9.463** | **.003** | **.080** |
| Lower-bound | **12.671** | **1.000** | **12.671** | **9.463** | **.003** | **.080** |
| stage \* rich | Sphericity Assumed | **.000** | **0** | **.** | **.** | **.** | **.000** |
| Greenhouse-Geisser | **.000** | **.000** | **.** | **.** | **.** | **.000** |
| Huynh-Feldt | **.000** | **.000** | **.** | **.** | **.** | **.000** |
| Lower-bound | **.000** | **.000** | **.** | **.** | **.** | **.000** |
| stage \* condition \* rich | Sphericity Assumed | **.000** | **0** | **.** | **.** | **.** | **.000** |
| Greenhouse-Geisser | **.000** | **.000** | **.** | **.** | **.** | **.000** |
| Huynh-Feldt | **.000** | **.000** | **.** | **.** | **.** | **.000** |
| Lower-bound | **.000** | **.000** | **.** | **.** | **.** | **.000** |
| Error(stage) | Sphericity Assumed | **145.951** | **109** | **1.339** |  |  |  |
| Greenhouse-Geisser | **145.951** | **109.000** | **1.339** |  |  |  |
| Huynh-Feldt | **145.951** | **109.000** | **1.339** |  |  |  |
| Lower-bound | **145.951** | **109.000** | **1.339** |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Tests of Within-Subjects Contrasts** | | | | | | | |
| Measure: IDt | | | | | | | |
| Source | stage | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| stage | Level 1 vs. Level 2 | **9.702** | **1** | **9.702** | **3.623** | **.060** | **.032** |
| stage \* gameno | Level 1 vs. Level 2 | **14.078** | **1** | **14.078** | **5.257** | **.024** | **.046** |
| stage \* condition | Level 1 vs. Level 2 | **25.342** | **1** | **25.342** | **9.463** | **.003** | **.080** |
| stage \* rich | Level 1 vs. Level 2 | **.000** | **0** | **.** | **.** | **.** | **.000** |
| stage \* condition \* rich | Level 1 vs. Level 2 | **.000** | **0** | **.** | **.** | **.** | **.000** |
| Error(stage) | Level 1 vs. Level 2 | **291.903** | **109** | **2.678** |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Tests of Between-Subjects Effects** | | | | | | |
| Measure: IDt | | | | | | |
| Transformed Variable: Average | | | | | | |
| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| Intercept | **425.984** | **1** | **425.984** | **230.372** | **.000** | **.679** |
| gameno | **1.208** | **1** | **1.208** | **.653** | **.421** | **.006** |
| condition | **.814** | **1** | **.814** | **.440** | **.509** | **.004** |
| rich | **.000** | **0** | **.** | **.** | **.** | **.000** |
| condition \* rich | **.000** | **0** | **.** | **.** | **.** | **.000** |
| Error | **201.553** | **109** | **1.849** |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Contrast Results (K Matrix)** | | | |
| condition Polynomial Contrasta | | | Averaged Variable |
| IDt |
| Linear | Contrast Estimate | | **.205** |
| Hypothesized Value | | **0** |
| Difference (Estimate - Hypothesized) | | **.205** |
| Std. Error | | **.310** |
| Sig. | | **.509** |
| 95% Confidence Interval for Difference | Lower Bound | **-.409** |
| Upper Bound | **.820** |
| a. Metric = 1.000, 2.000 | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Test Results** | | | | | | |
| Measure: IDt | | | | | | |
| Transformed Variable: AVERAGE | | | | | | |
| Source | Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| Contrast | **.814** | **1** | **.814** | **.440** | **.509** | **.004** |
| Error | **201.553** | **109** | **1.849** |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Estimates** | | | | |
| Measure: IDt | | | | |
| stage | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| 1 | **4.616a** | **.139** | **4.341** | **4.891** |
| 2 | **4.693a** | **.161** | **4.375** | **5.012** |
| a. Covariates appearing in the model are evaluated at the following values: gameno = 6.25. | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Pairwise Comparisons** | | | | | | |
| Measure: IDt | | | | | | |
| (I) stage | (J) stage | Mean Difference (I-J) | Std. Error | Sig.a | 95% Confidence Interval for Differencea | |
| Lower Bound | Upper Bound |
| 1 | 2 | **-.077** | **.155** | **.618** | **-.384** | **.229** |
| 2 | 1 | **.077** | **.155** | **.618** | **-.229** | **.384** |
| Based on estimated marginal means | | | | | | |
| a. Adjustment for multiple comparisons: Bonferroni. | | | | | | |

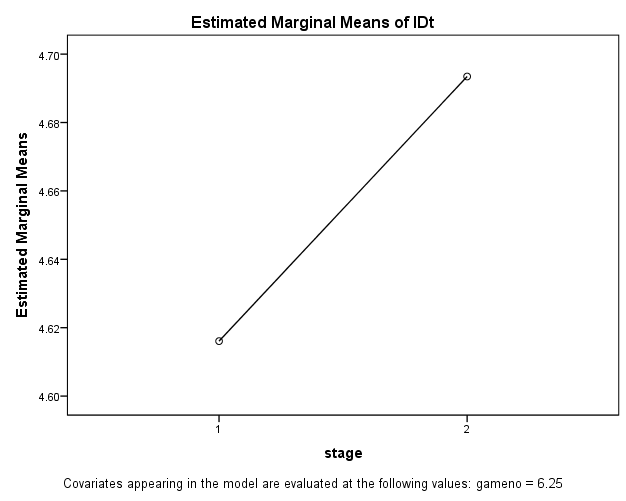
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Multivariate Tests** | | | | | | |
|  | Value | F | Hypothesis df | Error df | Sig. | Partial Eta Squared |
| Pillai's trace | **.002** | **.250a** | **1.000** | **109.000** | **.618** | **.002** |
| Wilks' lambda | **.998** | **.250a** | **1.000** | **109.000** | **.618** | **.002** |
| Hotelling's trace | **.002** | **.250a** | **1.000** | **109.000** | **.618** | **.002** |
| Roy's largest root | **.002** | **.250a** | **1.000** | **109.000** | **.618** | **.002** |
| Each F tests the multivariate effect of stage. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means. | | | | | | |
| a. Exact statistic | | | | | | |

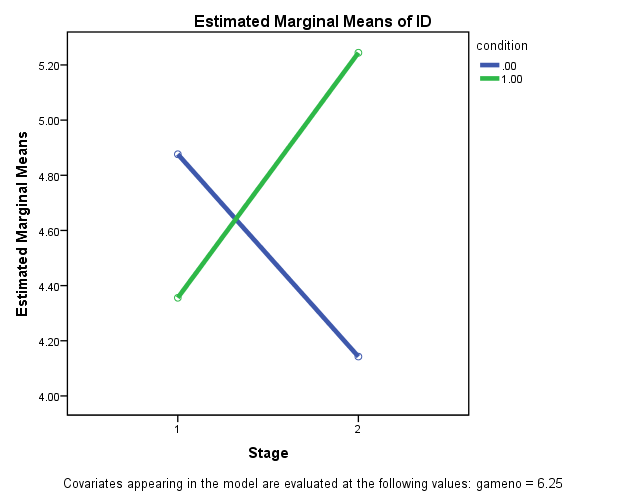
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Estimates** | | | | |
| Measure: IDt | | | | |
| condition | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| .00 | **4.509a** | **.254** | **4.006** | **5.013** |
| 1.00 | **4.800a** | **.254** | **4.297** | **5.303** |
| a. Covariates appearing in the model are evaluated at the following values: gameno = 6.25. | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Pairwise Comparisons** | | | | | | |
| Measure: IDt | | | | | | |
| (I) condition | (J) condition | Mean Difference (I-J) | Std. Error | Sig.a | 95% Confidence Interval for Differencea | |
| Lower Bound | Upper Bound |
| .00 | 1.00 | **-.291** | **.438** | **.509** | **-1.159** | **.578** |
| 1.00 | .00 | **.291** | **.438** | **.509** | **-.578** | **1.159** |
| Based on estimated marginal means | | | | | | |
| a. Adjustment for multiple comparisons: Bonferroni. | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Univariate Tests** | | | | | | |
| Measure: IDt | | | | | | |
|  | Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| Contrast | **.814** | **1** | **.814** | **.440** | **.509** | **.004** |
| Error | **201.553** | **109** | **1.849** |  |  |  |
| The F tests the effect of condition. This test is based on the linearly independent pairwise comparisons among the estimated marginal means. | | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **3. condition \* stage** | | | | | |
| Measure: IDt | | | | | |
| condition | stage | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| .00 | 1 | **4.876a** | **.274** | **4.333** | **5.419** |
| 2 | **4.143a** | **.317** | **3.514** | **4.772** |
| 1.00 | 1 | **4.356a** | **.274** | **3.813** | **4.899** |
| 2 | **5.244a** | **.317** | **4.615** | **5.873** |
| a. Covariates appearing in the model are evaluated at the following values: gameno = 6.25. | | | | | |





**Tests for ID (unequal groups conditions)**

|  |  |  |
| --- | --- | --- |
| **Between-Subjects Factors** | | |
|  | | N |
| condition | 1 | **51** |
| 2 | **54** |
| 3 | **55** |
| rich | .00 | **93** |
| 1.00 | **67** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptive Statistics** | | | | | |
|  | condition | rich | Mean | Std. Deviation | N |
| pre-ID mean | 1 | .00 | **4.2346** | **1.51295** | **27** |
| 1.00 | **4.6944** | **1.27373** | **24** |
| Total | **4.4510** | **1.41079** | **51** |
| 2 | .00 | **4.3951** | **1.49654** | **27** |
| 1.00 | **3.9506** | **1.50414** | **27** |
| Total | **4.1728** | **1.50295** | **54** |
| 3 | .00 | **4.2906** | **1.74245** | **39** |
| 1.00 | **3.8958** | **2.20006** | **16** |
| Total | **4.1758** | **1.87451** | **55** |
| Total | .00 | **4.3047** | **1.59305** | **93** |
| 1.00 | **4.2040** | **1.64117** | **67** |
| Total | **4.2625** | **1.60902** | **160** |
| post-Id mean | 1 | .00 | **4.1605** | **1.70562** | **27** |
| 1.00 | **4.5000** | **1.45463** | **24** |
| Total | **4.3203** | **1.58600** | **51** |
| 2 | .00 | **5.1235** | **1.72995** | **27** |
| 1.00 | **4.5309** | **1.93762** | **27** |
| Total | **4.8272** | **1.84373** | **54** |
| 3 | .00 | **5.0513** | **1.75142** | **39** |
| 1.00 | **4.7083** | **1.92017** | **16** |
| Total | **4.9515** | **1.79094** | **55** |
| Total | .00 | **4.8136** | **1.76415** | **93** |
| 1.00 | **4.5622** | **1.74966** | **67** |
| Total | **4.7083** | **1.75699** | **160** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Multivariate Testsa** | | | | | | | |
| Effect | | Value | F | Hypothesis df | Error df | Sig. | Partial Eta Squared |
| stage | Pillai's Trace | **.000** | **.002b** | **1.000** | **153.000** | **.969** | **.000** |
| Wilks' Lambda | **1.000** | **.002b** | **1.000** | **153.000** | **.969** | **.000** |
| Hotelling's Trace | **.000** | **.002b** | **1.000** | **153.000** | **.969** | **.000** |
| Roy's Largest Root | **.000** | **.002b** | **1.000** | **153.000** | **.969** | **.000** |
| stage \* gameno | Pillai's Trace | **.003** | **.414b** | **1.000** | **153.000** | **.521** | **.003** |
| Wilks' Lambda | **.997** | **.414b** | **1.000** | **153.000** | **.521** | **.003** |
| Hotelling's Trace | **.003** | **.414b** | **1.000** | **153.000** | **.521** | **.003** |
| Roy's Largest Root | **.003** | **.414b** | **1.000** | **153.000** | **.521** | **.003** |
| stage \* condition | Pillai's Trace | **.019** | **1.455b** | **2.000** | **153.000** | **.237** | **.019** |
| Wilks' Lambda | **.981** | **1.455b** | **2.000** | **153.000** | **.237** | **.019** |
| Hotelling's Trace | **.019** | **1.455b** | **2.000** | **153.000** | **.237** | **.019** |
| Roy's Largest Root | **.019** | **1.455b** | **2.000** | **153.000** | **.237** | **.019** |
| stage \* rich | Pillai's Trace | **.000** | **.074b** | **1.000** | **153.000** | **.786** | **.000** |
| Wilks' Lambda | **1.000** | **.074b** | **1.000** | **153.000** | **.786** | **.000** |
| Hotelling's Trace | **.000** | **.074b** | **1.000** | **153.000** | **.786** | **.000** |
| Roy's Largest Root | **.000** | **.074b** | **1.000** | **153.000** | **.786** | **.000** |
| stage \* condition \* rich | Pillai's Trace | **.001** | **.045b** | **2.000** | **153.000** | **.956** | **.001** |
| Wilks' Lambda | **.999** | **.045b** | **2.000** | **153.000** | **.956** | **.001** |
| Hotelling's Trace | **.001** | **.045b** | **2.000** | **153.000** | **.956** | **.001** |
| Roy's Largest Root | **.001** | **.045b** | **2.000** | **153.000** | **.956** | **.001** |
| a. Design: Intercept + gameno + condition + rich + condition \* rich  Within Subjects Design: stage | | | | | | | |
| b. Exact statistic | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Tests of Normality** | | | | | | | |
| condition | | Kolmogorov-Smirnova | | | Shapiro-Wilk | | |
| Statistic | df | Sig. | Statistic | df | Sig. |
| 1 | pre-ID mean | **.122** | **51** | **.056** | **.961** | **51** | **.090** |
| post-Id mean | **.155** | **51** | **.004** | **.948** | **51** | **.026** |
| 2 | pre-ID mean | **.084** | **54** | **.200\*** | **.961** | **54** | **.080** |
| post-Id mean | **.194** | **54** | **.000** | **.888** | **54** | **.000** |
| 3 | pre-ID mean | **.093** | **55** | **.200\*** | **.940** | **55** | **.009** |
| post-Id mean | **.273** | **55** | **.000** | **.849** | **55** | **.000** |
| \*. This is a lower bound of the true significance. | | | | | | | |
| a. Lilliefors Significance Correction | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Mauchly's Test of Sphericitya** | | | | | | | |
| Measure: IDt | | | | | | | |
| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilonb | | |
| Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| stage | **1.000** | **.000** | **0** | **.** | **1.000** | **1.000** | **1.000** |
| Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix. | | | | | | | |
| a. Design: Intercept + gameno + condition + rich + condition \* rich  Within Subjects Design: stage | | | | | | | |
| b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table. | | | | | | | |

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| **Tests of Within-Subjects Effects** | | | | | | | |
| Measure: IDt | | | | | | | |
| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| stage | Sphericity Assumed | **.003** | **1** | **.003** | **.002** | **.969** | **.000** |
| Greenhouse-Geisser | **.003** | **1.000** | **.003** | **.002** | **.969** | **.000** |
| Huynh-Feldt | **.003** | **1.000** | **.003** | **.002** | **.969** | **.000** |
| Lower-bound | **.003** | **1.000** | **.003** | **.002** | **.969** | **.000** |
| stage \* gameno | Sphericity Assumed | **.729** | **1** | **.729** | **.414** | **.521** | **.003** |
| Greenhouse-Geisser | **.729** | **1.000** | **.729** | **.414** | **.521** | **.003** |
| Huynh-Feldt | **.729** | **1.000** | **.729** | **.414** | **.521** | **.003** |
| Lower-bound | **.729** | **1.000** | **.729** | **.414** | **.521** | **.003** |
| stage \* condition | Sphericity Assumed | **5.125** | **2** | **2.563** | **1.455** | **.237** | **.019** |
| Greenhouse-Geisser | **5.125** | **2.000** | **2.563** | **1.455** | **.237** | **.019** |
| Huynh-Feldt | **5.125** | **2.000** | **2.563** | **1.455** | **.237** | **.019** |
| Lower-bound | **5.125** | **2.000** | **2.563** | **1.455** | **.237** | **.019** |
| stage \* rich | Sphericity Assumed | **.130** | **1** | **.130** | **.074** | **.786** | **.000** |
| Greenhouse-Geisser | **.130** | **1.000** | **.130** | **.074** | **.786** | **.000** |
| Huynh-Feldt | **.130** | **1.000** | **.130** | **.074** | **.786** | **.000** |
| Lower-bound | **.130** | **1.000** | **.130** | **.074** | **.786** | **.000** |
| stage \* condition \* rich | Sphericity Assumed | **.157** | **2** | **.079** | **.045** | **.956** | **.001** |
| Greenhouse-Geisser | **.157** | **2.000** | **.079** | **.045** | **.956** | **.001** |
| Huynh-Feldt | **.157** | **2.000** | **.079** | **.045** | **.956** | **.001** |
| Lower-bound | **.157** | **2.000** | **.079** | **.045** | **.956** | **.001** |
| Error(stage) | Sphericity Assumed | **269.471** | **153** | **1.761** |  |  |  |
| Greenhouse-Geisser | **269.471** | **153.000** | **1.761** |  |  |  |
| Huynh-Feldt | **269.471** | **153.000** | **1.761** |  |  |  |
| Lower-bound | **269.471** | **153.000** | **1.761** |  |  |  |

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| **Tests of Within-Subjects Contrasts** | | | | | | | |
| Measure: IDt | | | | | | | |
| Source | stage | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| stage | Level 1 vs. Level 2 | **.005** | **1** | **.005** | **.002** | **.969** | **.000** |
| stage \* gameno | Level 1 vs. Level 2 | **1.458** | **1** | **1.458** | **.414** | **.521** | **.003** |
| stage \* condition | Level 1 vs. Level 2 | **10.250** | **2** | **5.125** | **1.455** | **.237** | **.019** |
| stage \* rich | Level 1 vs. Level 2 | **.259** | **1** | **.259** | **.074** | **.786** | **.000** |
| stage \* condition \* rich | Level 1 vs. Level 2 | **.314** | **2** | **.157** | **.045** | **.956** | **.001** |
| Error(stage) | Level 1 vs. Level 2 | **538.941** | **153** | **3.522** |  |  |  |

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| **Tests of Between-Subjects Effects** | | | | | | |
| Measure: IDt | | | | | | |
| Transformed Variable: Average | | | | | | |
| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| Intercept | **141.604** | **1** | **141.604** | **71.905** | **.000** | **.320** |
| gameno | **.324** | **1** | **.324** | **.164** | **.686** | **.001** |
| condition | **.641** | **2** | **.320** | **.163** | **.850** | **.002** |
| rich | **.921** | **1** | **.921** | **.468** | **.495** | **.003** |
| condition \* rich | **6.365** | **2** | **3.182** | **1.616** | **.202** | **.021** |
| Error | **301.305** | **153** | **1.969** |  |  |  |

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| **Contrast Results (K Matrix)** | | | |
| condition Polynomial Contrasta | | | Averaged Variable |
| IDt |
| Linear | Contrast Estimate | | **.182** |
| Hypothesized Value | | **0** |
| Difference (Estimate - Hypothesized) | | **.182** |
| Std. Error | | **.357** |
| Sig. | | **.611** |
| 95% Confidence Interval for Difference | Lower Bound | **-.524** |
| Upper Bound | **.889** |
| Quadratic | Contrast Estimate | | **-.020** |
| Hypothesized Value | | **0** |
| Difference (Estimate - Hypothesized) | | **-.020** |
| Std. Error | | **.207** |
| Sig. | | **.924** |
| 95% Confidence Interval for Difference | Lower Bound | **-.428** |
| Upper Bound | **.388** |
| a. Metric = 1.000, 2.000, 3.000 | | | |

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| **Test Results** | | | | | | |
| Measure: IDt | | | | | | |
| Transformed Variable: AVERAGE | | | | | | |
| Source | Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| Contrast | **.641** | **2** | **.320** | **.163** | **.850** | **.002** |
| Error | **301.305** | **153** | **1.969** |  |  |  |

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| **Estimates** | | | | |
| Measure: IDt | | | | |
| stage | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| 1 | **4.240a** | **.132** | **3.978** | **4.502** |
| 2 | **4.679a** | **.144** | **4.395** | **4.963** |
| a. Covariates appearing in the model are evaluated at the following values: gameno = 7.3500. | | | | |

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| **Pairwise Comparisons** | | | | | | |
| Measure: IDt | | | | | | |
| (I) stage | (J) stage | Mean Difference (I-J) | Std. Error | Sig.b | 95% Confidence Interval for Differenceb | |
| Lower Bound | Upper Bound |
| 1 | 2 | **-.439\*** | **.154** | **.005** | **-.743** | **-.136** |
| 2 | 1 | **.439\*** | **.154** | **.005** | **.136** | **.743** |
| Based on estimated marginal means | | | | | | |
| \*. The mean difference is significant at the .05 level. | | | | | | |
| b. Adjustment for multiple comparisons: Bonferroni. | | | | | | |

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| **Multivariate Tests** | | | | | | |
|  | Value | F | Hypothesis df | Error df | Sig. | Partial Eta Squared |
| Pillai's trace | **.051** | **8.174a** | **1.000** | **153.000** | **.005** | **.051** |
| Wilks' lambda | **.949** | **8.174a** | **1.000** | **153.000** | **.005** | **.051** |
| Hotelling's trace | **.053** | **8.174a** | **1.000** | **153.000** | **.005** | **.051** |
| Roy's largest root | **.053** | **8.174a** | **1.000** | **153.000** | **.005** | **.051** |
| Each F tests the multivariate effect of stage. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means. | | | | | | |
| a. Exact statistic | | | | | | |

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| **Estimates** | | | | |
| Measure: IDt | | | | |
| condition | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| 1 | **4.323a** | **.270** | **3.789** | **4.856** |
| 2 | **4.476a** | **.200** | **4.080** | **4.871** |
| 3 | **4.581a** | **.312** | **3.965** | **5.196** |
| a. Covariates appearing in the model are evaluated at the following values: gameno = 7.3500. | | | | |

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| **Pairwise Comparisons** | | | | | | |
| Measure: IDt | | | | | | |
| (I) condition | (J) condition | Mean Difference (I-J) | Std. Error | Sig.a | 95% Confidence Interval for Differencea | |
| Lower Bound | Upper Bound |
| 1 | 2 | **-.153** | **.301** | **1.000** | **-.882** | **.576** |
| 3 | **-.258** | **.506** | **1.000** | **-1.482** | **.966** |
| 2 | 1 | **.153** | **.301** | **1.000** | **-.576** | **.882** |
| 3 | **-.105** | **.406** | **1.000** | **-1.089** | **.879** |
| 3 | 1 | **.258** | **.506** | **1.000** | **-.966** | **1.482** |
| 2 | **.105** | **.406** | **1.000** | **-.879** | **1.089** |
| Based on estimated marginal means | | | | | | |
| a. Adjustment for multiple comparisons: Bonferroni. | | | | | | |

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| **Univariate Tests** | | | | | | |
| Measure: IDt | | | | | | |
|  | Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| Contrast | **.641** | **2** | **.320** | **.163** | **.850** | **.002** |
| Error | **301.305** | **153** | **1.969** |  |  |  |
| The F tests the effect of condition. This test is based on the linearly independent pairwise comparisons among the estimated marginal means. | | | | | | |

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| **3. condition \* stage** | | | | | |
| Measure: IDt | | | | | |
| condition | stage | Mean | Std. Error | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| 1 | 1 | **4.310a** | **.311** | **3.696** | **4.925** |
| 2 | **4.335a** | **.338** | **3.668** | **5.002** |
| 2 | 1 | **4.123a** | **.231** | **3.666** | **4.579** |
| 2 | **4.829a** | **.251** | **4.334** | **5.324** |
| 3 | 1 | **4.287a** | **.359** | **3.577** | **4.997** |
| 2 | **4.874a** | **.390** | **4.104** | **5.644** |
| a. Covariates appearing in the model are evaluated at the following values: gameno = 7.3500. | | | | | |

